Art. XIII. — *On the Occurrence of Acrotreta in Lower Palaeozoic (Lancefieldian and Heathcotian) Shales in Victoria.*

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(With Plate XXVI.).

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General Remarks.

The specimens forming the basis of the present paper come from two sources.

(1) The better preserved specimens, dorsal and ventral valves, were found by Professor Skeats, D.Sc., in a road-metal heap E. of Mount William railway station and N.E. of Lancefield. The matrix is a whitish or pale ashen grey siliceous shale, with obscure crustacean remains (cf. *Hymenocaris*). In thin sections under a high power, small cruciform spicules can be distinguished, probably referable to *Protospongia*.

(2) A smaller and slightly crushed and distorted interior of a dorsal valve, apparently belonging to the same species, was found by the late Dr. T. S. Hall, M.A., near Lancefield, which he presented to the Museum in 1908.

When first examining Prof. Skeats' specimens, I was struck with their resemblance to certain Cambrian brachiopods formerly placed in the genus *Linnarssonia* by C. D. Walcott, which genus has since been merged into *Acrotreta*, Kutorga. *Acrotreta* is a genus of more or less cone-shaped brachiopods in which the pedicle opening is simple, circular and apical on the central valve. The false cardinal area is apparent in the cast of the ventral valve in one of the present specimens.

Acrotreta antipodum, sp. nov. (Plate XXVI.)

Description.—Valves wider than long, subovate in outline; posterior obtuse to depressed, with a false cardinal area. Ventral valve moderately high; pedicle opening situated about one-fifth from the posterior margin, apex concavely sloping to the posterior,

and gently convexly to the anterior margin. The exterior of a ventral valve shows the ornament to be strongly concentric (tegulate), the edges of the concentric laminae being acerate or sparsely spinose. An exfoliated dorsal valve shows the impression of the median septum with divergent furrows and rhomboidal termination; also muscle scars near the hinge. The interior of the dorsal valve from Lancefield (somewhat distorted) shows the median septum and lateral scars.

Dimensions.—Ventral valve—length (in all the figured specimens from the Mount William district), 2.25 mm.; width, 2.75 mm. Dorsal valve—length, 1.25 mm.; width, 1.5 mm.

The smaller specimen, from the black shale of Lancefield, has a length of 1.5 mm., and a similar width, the latter probably due to a lateral distortion.

Occurrence.—Ventral and dorsal valves in grey siliceous shale from stone heap E. of Mount William railway station. Collected by Prof. E. W. Skeats, D.Sc. Dorsal valve in black Lower Ordovician shale, Lancefield. (Coll. by Dr. T. S. Hall, M.A.; pres. 4.3.08).

Relationships.—The above species belongs to the group of depressed *Acrotretæ*, of which *Acrotreta sagittalis*, Davidson sp.[1] forms a central type. In that species the valves are not so laterally widened as in the Victorian, and in this respect there is a nearer approach to the present species in *Acrotreta belti*, Davidson sp.[2], in which again the laterally ovoid outline is not so pronounced as in *A. antipodum*. In the surface ornament *A. sagittalis*, by its concentric laminae, shows closer affinity with *A. antipodum*, but it is not so strong, nor even inclined to spinosity as in the Victorian species. *A. sagittalis* is a Menevian fossil in Wales, and *A. belti* occurs in the Lower Tremadoc.

Another related form is *Acrotreta bellatula*, Walcott,[3] a Middle Cambrian species from Millard County, Utah. This is a depressed form, having a more circular outline, and with the apex close to the posterior margin; whilst the surface of the valve is moderately smooth or finely concentric.

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1 *Obolella sagittalis*, Salter MS. Rep. Brit. Assoc., 1865, p. 285.
Discina labiosa, Idem, ibid (name only).
Obolella sagittalis, Davidson. Geol. Mag., vol. v., 1868, p. 309, pl. xv., figs. 17-24.
Linnarssonia sagittalis, Dav. sp. Hall and Clarke, Pal. N. York, vol. viii., pt. i., 1892, p. 108.

2 *Obolella belti*, Davidson. Geol. Mag., vol. v., 1868, p. 310, pl. xv., figs. 25-27.

3 Smithsonian Misc. Coll., vol. liii., 1908, p. 93, pl. ix. figs. 4, 4a, b.

In the St. John Group (Middle Cambrian), of New Brunswick, *Acrotreta transversalis*, Hartt sp. occurs[1] which form, belonging to the *A. sagittalis* group, is strikingly like the Victorian species, except in surface ornament.

Summary.

The group to which the present species is closely allied is Middle Cambrian in America (St. John Group), and Middle and Upper Cambrian (Menevian and Tremadoc) in Wales. Further light is thus thrown upon the homotaxial relationship of the Victorian lowest palaeozoic strata with that of other widely separated areas, by the discovery of the above fossils, and in view of the results of the recent examination by the writer, of the Heathcotian fauna, there is perhaps little, if any doubt, that these Heathcotian beds should now be regarded as of Upper Cambrian age. Since the Heathcotian has already been shown by Professor Skeats[2] to form one continuous series with the Lower Ordovician (Lancefieldian), it is now more difficult than ever to draw a distinct line between the Upper Cambrian and the Lower Ordovician in Victoria, and the occurrence of the form of *Acrotreta* herein described from Lancefield goes further to show that, in the Lancefieldian itself, as is well known, a fair number of Cambrian fossil types coexisted with Ordovician forms. Thus, *Clinograptus tenellus* is Cambrian in some beds elsewhere, *Bryograptus* is Cambrian in Europe and both Upper Cambrian and Lower Ordovician in New York State, whilst the oldest species of *Tetragraptus* seem to represent the transitional zones between Cambrian and Ordovician.

In conclusion, I wish to express my thanks to Mr. R. A. Keble for confirmatory evidence regarding the distribution of the graptolites.

EXPLANATION TO PLATE XXVI.

Fig. 1.—*Acrotreta antipodum*, sp. nov. Exterior of ventral valve. Probably Heathcotian. Mount William district. × 10.

,, 2.—Ditto. Surface ornament, enlarged. × 30.

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1 *Obolella transversa*, Hartt. Bull. U.S. Geol. Surv., No. 10, 1868, p. 644, pl. i., fig. 55a. *Linnarssonia transversa*, Hartt sp. G. F. Matthew, Trans. R. Soc. Can., vol. iii., sect. iv., 1885, p. 35, pl. v., figs. 11, 11*a-e*.

2 "On the Evidence of the Origin, Age and Alteration of the Rocks near Heathcote, Victoria." Proc. Roy. Soc. Victoria, vol. xxi. (n.s.), pt. i., 1908, p. 302.

,, 3.—Ditto. Profile of valve. × 10.

,, 4.—An exfoliated dorsal valve, showing impression of median septum. Probably Heathcotian. Mount William district. × 10.

,, 5.—Ditto. Profile of valve. × 10.

,, 6.—Ditto. Interior of dorsal valve. Probably Heathcotian. Mount William district. × 10.

,, 7.—Interior of dorsal valve, showing median septum and muscle scars. Lower Ordovician. Lancefield. × 10.